CentricoBRIEFING NOTE

Using ITS to manage Europe's busiest roads

Traffic Forecast Using Weather Predictions

SUMMARY

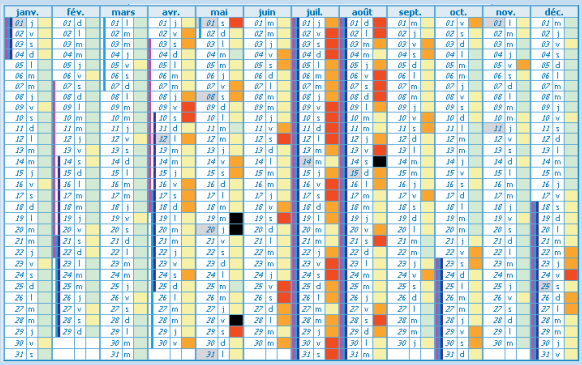
For several years, the SAPN and Phoenix ISI have been working on efficient methods to forecast traffic, and have developed an efficient medium term traffic predictive tool. This elaborate system estimates expected road traffic volumes by extrapolating historical data of similar periods. These predictions can then be used to establish levels of operation services.

Recently, the forecasting algorithm has been improved; it now also takes into account weather forecasts to predict traffic levels.

INTRODUCTION

The forecasting tool helps to plan operating and maintenance activities as well as security tasks. It delivers information (in-house or to the public) through various ways, and more generally, it can support road operators and road authorities for all their traffic management tasks.

The SAPN's forecasting tool is composed of two main elements: the prediction and the consultation modules.



The Prediction Module

The Prediction method is based on:

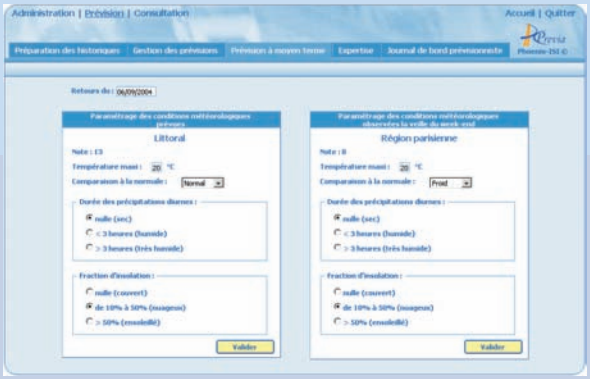
- The use of historical data sets that have been qualified
- An exhaustive calendar definition (holidays, weekends …) for each year
- A set of weight factors (for each type of day)
- A reference estimation using the Annual Average of Hourly Traffic Average (AAHT)
- The use of average value (to reduce odd values)
- 3 day weather forecasts:

At the beginning of the year a traffic forecast per hour can be made for the entire year on every section of the network, using past measures of traffic volumes and the calendar year (weekends, bank holidays …). With the weather prediction input, three days ahead of a specific date, the traffic prediction can be refined, and the forecast accuracy is thus improved.

The Consultation Module

This module is available on any authorised client's intranet station. The user can monitor:

- The historical and expected evolution of the debit per hour (graphic or histogram) for specific location on any given day.
- Monthly arrays that show hourly debit rates of a specific location during one month.
- Daily arrays that display hourly debit rates for a set of positions for any given day.



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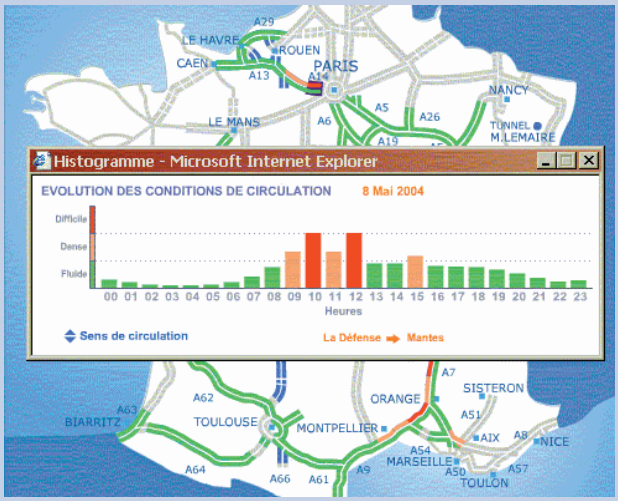
Taking Into Account Weather Forecasts

The motorway network of the SAPN can be very busy on weekends, mainly because of inhabitants of the greater Paris area travelling to Normandy. It has been noticed in a very recurrent way that weather had a very significant influence on the traffic. Indeed meteorological conditions reflect on traffic volumes, and on the distribution of the traffic during a given time.

For example, on a very sunny Sunday, returns towards the capital city occur very late in the day: people tend to benefit as much as possible of the warmth outdoors. On the basis of these observations, the SAPN developed algorithms of improved traffic forecasts, for three days ahead. These corrections take into account, amongst other things, the level of sun forecasted over the specific period, or the length of rainfalls.



In addition, the refining using weather predictions is only set if the day re-estimated has a weather prediction either  or  , in other words if it is not an average weather day.

This improvement in the accuracy of traffic predictions has benefited both to users and road operators.

The Weather Correction Factor

The weather data taken into account are: the temperature, the duration of rainfalls, and the amount of sunlight. The SAPN, based on historical data, has identified the associated variation of traffic when having a particular weather context compared to regular traffic conditions. This analysis has lead to the estimation of a weather weight factor. It is then applied to the initial traffic forecast (done at the beginning of the year) to refine 3 days prediction ahead.

The weight factor is calculated by quantifying the difference between a given weather context and a normal weather context.

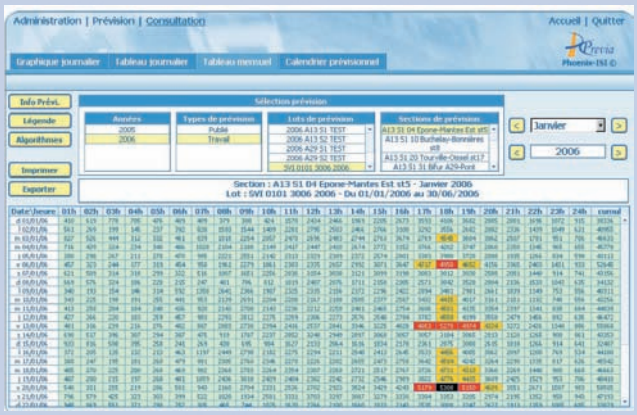
In order to evaluate the efficiency of their enhanced traffic prediction method, the SAPN has compared:

- Traffic forecasts without taking into account weather predictions
- Traffic forecasts taking into account weather predictions
- The real traffic measured on the SAPN's network

The evaluation took place on the SAPN network, between June and September 2005.

Results

The first results show a noticeable improvement of the quality of the traffic forecast when taking into account weather corrections; the forecast times shift toward the measured traffic volumes.



For further information on the traffic forecast using weather predictions:

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